

CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

1. (currently amended) An isolated and purified nucleic acid molecule encoding an $\alpha 2\delta$ -4 calcium channel subunit protein, said nucleic acid molecule comprising a member selected from the group consisting of:

- (a) a polynucleotide encoding a polypeptide having a sequence and biological activities substantially same as a polypeptide of SEQ ID NO: 10;
- (b) a nucleic acid molecule that is complementary to the polynucleotide of (a);
- (c) a nucleic acid molecule comprising at least 15 sequential bases of the polynucleotide of (a) or (b);
- (d) a nucleic acid molecule that hybridizes under a stringent conditions condition to the polynucleotide molecule of (a), wherein said stringent condition comprises washing the hybrid at 65 °C with a buffer containing 0.04 M sodium phosphate, 1% SDS and 1 mM EDTA;
- (e) a nucleic acid molecule that encodes a splice variant of a human $\alpha 2\delta$ -4 calcium channel subunit comprising exon 1B;
- (f) a nucleic acid molecule that encodes a splice variant of a human $\alpha 2\delta$ -4 calcium channel subunit comprising exon 37B; and
- (g) a nucleic acid molecule that encodes a splice variant of a human $\alpha 2\delta$ -4 calcium channel subunit comprising exon 1B and exon 37B.

2. (currently amended) Any one of the nucleic acid molecules of claim 1 wherein the polynucleotide is RNA.

3. (currently amended) Any one of the nucleic acid molecules of claim 1 wherein the polynucleotide is DNA.

4. (currently amended) The An isolated and purified nucleic acid molecule of claim 1, having a nucleotide sequence of SEQ ID NO:9.

5. (currently amended) An expression vector to express an $\alpha 2\delta$ -4 calcium channel subunit protein in a recombinant host cell, ~~herein~~ wherein said vector contains a nucleic acid sequence encoding a polypeptide having a sequence and biological activities substantially same as a polypeptide of SEQ ID NO:10.

6. (Canceled).

7. (currently amended) A ~~cultured~~ recombinant host cell containing an expression vector of claim 5.

8. (Canceled).

9. (Withdrawn) A protein, in substantially pure form having at least a 95% identity with a polypeptide comprising amino acids 1-1090 of SEQ ID NO.: 10.

10. (Withdrawn) The protein according to claim 9, having an amino acid sequence of: SEQ.ID.NO.:10.

11. (Withdrawn) A monospecific antibody immunologically reactive with an $\alpha 2\delta$ -4 calcium channel subunit protein.

12. (Withdrawn) The antibody of claim 11, wherein the antibody blocks activity of the $\alpha 2\delta$ -4 calcium channel subunit protein.

13. (currently amended) A method for expressing an $\alpha 2\delta$ -4 calcium channel subunit protein in a recombinant host cell, comprising the steps of:

(a) introducing an expression vector ~~capable~~ capable of encoding an $\alpha 2\delta$ -4 calcium channel subunit protein a polypeptide having a sequence of SEQ ID NO:10 into a cell; and

(b) culturing the cells under conditions that allow expression of the ~~α2δ-4 calcium channel subunit protein~~ ~~said polypeptide~~ from the expression vector.

14. (Withdrawn) A method for identifying compounds that alter α2δ-4 calcium channel subunit protein activity in a cell, comprising the steps of:

- a) contacting a compound with a cell containing an α2δ-4 calcium channel subunit, and
- b) measuring a change in the cell in response to the contacting step.

15. (Withdrawn) The method of claim 14 wherein the cell contains three additional calcium channel subunits: an alpha2 subunit, a beta subunit, and a gamma subunit; and wherein the three subunits and the α2δ-4 subunit form a calcium channel complex.

16. (Withdrawn) The method of claim 15 wherein the calcium channel complex is an L-type Voltage Sensitive Calcium Channel.

17. (Withdrawn) The method of claim 15 wherein the measuring step is measuring the influx of Ca^{2+} into the cell.

18. (Withdrawn) A method comprising the steps of:

- (a) incubating a cell membrane from a cell expressing recombinant α2δ-4 with radioactive gabapentin (GBP) and a candidate compound, wherein the membrane comprises an α2δ-4 subunit of calcium channel and wherein the incubating step is for sufficient time to allow GBP binding to the α2δ-4 subunit of calcium channels in the cell membranes,
- (b) separating the cell membranes from unbound radioactive GBP,
- (c) measuring binding of the radioactive GBP to the cell membranes, and

(d) identifying a compound that inhibits GBP binding by a reduction of the amount of radioactive GBP in step (c) to an established control.

19. (Withdrawn) A method for identifying compounds that alters $\alpha 2\delta$ -4 calcium channel subunit protein activity, comprising the steps of:

(a) combining a compound, a measurably labeled ligand for the $\alpha 2\delta$ -4 calcium channel subunit protein, and a $\alpha 2\delta$ -4 calcium channel subunit protein, and

(b) measuring binding of the compounds to the subunit protein by a reduction in the amount labeled ligand binding to the $\alpha 2\delta$ -4 calcium channel subunit protein.

20. (Withdrawn) A compound active in any one of the methods of claim 14, claim 18, or claim 19, wherein said compound is an agonist or antagonist of an $\alpha 2\delta$ -4 calcium channel.

21. (Withdrawn) A compound active in the method of claim 14, wherein said compound is a modulator of expression of a $\alpha 2\delta$ -4 calcium channel subunit.

22. (Withdrawn) A pharmaceutical composition comprising a compound active in the method of claim 14, wherein said compound is a modulator of calcium channel activity.

23. (Withdrawn) A poly peptide having a sequence and biological activities substantially same as a polypeptide of SEQ ID NO:10.